

NIR PREDICTIONS OF INDIRECT RESPONSES

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NIR has been extensively used to predict directly measurable properties of materials that are important to the appropriate industries. Commonly, NIR is used to perform fast, routine tests to improve control response as against the response time for the (normally chemical) base test.

This paper discusses the use of NIR to measure indirect properties of materials. In these cases, the pure chemical or physical tests are either unable measure the appropriate parameters (eg GMO modification) or there are mitigating effects that are not properly addressed by the base tests.

In particular, we looked at the digestible portion of amino acids within meat and bone meal. This is the desired response measurement by end-users of the product (intensive livestock producers) but is currently unable to be offered as a measurement by producers.

The base test method is by controlled feeding trials. These are somewhat cumbersome, taking 2-3 months, involving several sets of animals, and considerable expense. A shortened test (feed trial based) would be of little use, as the precision blows out over short period feeding trials. For example, a rat ileal digestibility test requires around 2 months, and costs some \$USD1000. This is clearly impractical test for a producer involved in continuous production, with a 1-2 day turn around.

While the amino acid abundance is accessible chemically, the uptake of amino acids into usable material by mammalian species is not simply related to the measured abundance within the material. There are many co-related material properties that might help or hinder uptake, some chemical based (eg protein damage), some indirect (eg palatability), some physiological (intestinal tract response vs speed of throughput).

We discuss the approaches taken to provide a suitable reference data set, and present the derived prediction and validation relationships.